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CONTENTS.

Notes and News.

Railway Electrification.

The cause of railway electrification in this country has been considerably advanced of late through the efforts of Mr. G. H. Kirkland, of the S.A. General Electric Company. Through Mr. Kirkland's courtesy, the electrical and railway engineers of the Rand were privileged to witness on Tuesday an excellent film depicting the electrified section of the Chicago, Milwaukee and St. Paul railway, and the building of the great electric locomotives for that undertaking by the General Electric Company. On Thursday night Mr. Kirkland read, before the S.A. Institute of Electrical Engineers the concluding portion of his paper on the same railway, and illustrated by a number of lantern slides the technical details of the scheme, making particular reference to the method of regenerative control which has proved of such great advantage in hilly country. In another part of this issue we reprint the first portion of Mr. Kirkland's paper read before the Institute, from which it will be seen that the conditions so successfully met in the United States are not dissimilar from those in South Africa. That railway electrification is now a question of practical interest in this country was very clearly indicated on Tuesday by Sir William Hoy, who made no secret of the fact that the best expert advice from oversea has now been enlisted by the Union Government in regard to the subject. The Capetown and Johannesburg suburban lines and the section of the Natal line between Durban and Mooi River are generally regarded as most suitable for electrification; and it is satisfactory to know that the economics of the question are now being studied. Engineering difficulties, it is clear, there are none. The remainder of Mr. Kirkland's paper, including his review of the advantages of railway electrification will appear in future issues.

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Oceana Development: Drilling Stopped.

Earlier in the year an agreement was entered into between the board and Mr. G. R. Bonnard giving the latter the right to bore on the company's property in the Far East Rand. Work was to begin on June 16. Delays occurred and an extension of time was granted. In the annual report it was stated that Mr. S. C. Dyer was preparing a report upon the proposed development work for his principal, Mr. Bonnard, upon the receipt of which the names of those associated with Mr. Bonnard in the contract would be disclosed. Mr. Bonnard has now received a cabled report from Mr. Dyer, in connection with which he claims the right to cancel the contract. The directors do not recognise the claim, so that an interesting position has arisen.

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Rhodesian Asbestos.

The scheme for the amalgamation of various asbestos interests in Rhodesia, upon which Mr. Edmund Davis has been hard at work for a considerable time, has now been brought to fruition. At the meeting of the British South Africa Company Sir Starr Jameson referred to the matter thus: "That marvellous mineral developmenter, Mr. Edmund Davis, has taken the whole question in hand. I believe he has a company now either formed or forming to deal with the asbestos industry. He will probably mop up a great many of the private concerns; he usually does; and in the asbestos industry I understand it is absolutely necessary that there should be co-operation in both the grading and the selling of the asbestos if it is to be a successful industry." The new company has a capital of £400,000, of which £30,000 is working capital, and besides acquiring the properties of the Charterland and General Exploration and the Victoria (Rhodesia) Asbestos has also taken over forward contracts. The properties are equipped for production on an extensive scale, and good profits are hinted at.

The Amal. Props.' Lost Appeal.

Ever since Mr Justice Eve delivered his elaborate judgment last December in the record breaking litigation between the Amalgamated Properties of Rhodesia and the Globe and Phoenix Gold Mining Company, it has been clear that the appeal of the former company stood but a small chance of success. However, having already incurred a liability of £65,000 for the defendants' taxed costs, the plaintiffs could hardly do other than venture the few thousand pounds more necessary to carry the case higher. The Appeal Judges' unanimous decision is, however, against them. Nevertheless, they now announce their intention—which the obtaining of a guarantee for the carrying through of the reconstruction scheme has rendered possible—to go to the House of Lords in due course. Before the last has been heard of this remarkable case it looks as if the legal profession will have carved up some £200,000.

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Netherlands Bank Results.

A year ago the dividend of the Netherlands Bank of South Africa was increased from 3 to 4 per cent.; for the past twelve months it is to be further raised to 5 per cent., and whereas for 1915 the reserves received £2,313, this time £3,333 is to be devoted to the same purpose, besides £1,667 for taxes and £1,000 to the pension fund. The net profit rose from £12,133 to £18,497 and a rather larger balance will be carried forward. The report states that in spite of the many difficulties which continued to impede trade between Europe and South Africa the bank was able, while keeping the resources very liquid, to do a sufficient business to enable it to make a satisfactory profit, an amount about the same as in the years preceding the war.

* * * *

Rezende Mines.

An interesting description of development operations was given by the chairman at the annual meeting in mail week of the Rezende Mines. In the summary it was stated as regards the Old West Section that the ore body on No. 5 level is ready for development, so that the reserves could, if desired, be considerably and rapidly increased. "The position, therefore, from an ore reserve point of view is a very strong one, and the mine is laid out to yield a large monthly tonnage." In these circumstances the Old West Section may be looked upon as a valuable asset in the near future. Speaking generally, the chairman said that the developments in the Eastern section now being undertaken practically amount to the opening of a promising new mine, and efforts are being made to accomplish this without disturbing the financial reserves of the company.

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Gold in North-Eastern Congo.

Sir Alfred Sharpe, in the course of an interview published in London, states that during the recent expedition, in which he spent nearly three months in the North-Eastern Congo, he found that an enormous area of gold-bearing deposits, both in alluvial and reef formation, had been located and systematically proved by the Belgian authorities. The Kilo Gold Mines, situated three days' trek east of the Albert Nyanza, have for years produced considerable quantities of alluvial gold, but the rich deposits seem to extend almost indefinitely over the whole Aruwimi-Uelle basin, and are already connected by a first-class road for heavy motor traffic with the Upper Nile at Rejaf, near the southernmost point of the Soudan.

* * * *

Vryheid (Natal) Coal and Railway.

The position of the Vryheid (Natal) Coal and Railway Company, as disclosed at the annual meeting, has greatly improved in recent times, and to-day it is the largest producer of coal of any single colliery in Natal. Last year the output was as much as 421,165 tons, or a monthly average of 35,000 tons, while the actual capacity is 40,000 tons per month. The coal area owned justifies a still larger plant, and to provide the funds for increasing the scale of operations, and generally to put the company on a sound and sufficient basis, shareholders in London recently unanimously approved a re-arrangement of capital. Under it the company will have a share capital of £367,406 in £1 ordinary shares—of which £132,594 will be available for later issue as required—and a debenture capital of £100,000. With a capital position thus reinforced the operations of the company will be enlarged.

* * * *

Rhodesia Exploration Co.

There was registered at Somerset House on July 7 the newly-formed Rhodesia Exploration Co., Ltd., with a capital of £600,000 in 3s. shares. An agreement has been entered into with the Amalgamated Properties of Rhodesia (1913), Ltd., and its liquidators to acquire farms, properties, mines, concessions, leases, claims, licenses, and rights, to prospect, explore, open, and work claims or mines, to raise, dig, and quarry for gold, silver, minerals, ores, diamonds, precious stones, and other substances, etc. The first directors are Mr. F. H. Hamilton, Mr. H. G. Latilla, and Mr. R. Sewell.

* * * *

The July Output.

The gold output for July was declared last week at 757,839 ozs., a decrease of 1,885 ozs., of which the Witwatersrand decrease was 951 ozs. and outside districts 934 ozs. The detailed returns appeared in our last issue. The number of natives last month employed on the gold mines was 171,653, a shortage compared with June of 4,074, and the June return showed a decrease of 4,441 compared with May. The total figures of the output are:—Total output, 757,839 ozs., value £3,219 094; decrease, 1,885 ozs., value £8,007. Witwatersrand, 731,848 ozs., value £3,108,693; decrease, 951 ozs., value £4,039. Outside districts, 25,991 ozs., value £110,401; decrease, 934 ozs., value £3,968. Stamps, 9,428; decrease, 97.

* * * *

Pooling of Mining Supplies.

A Joint Committee, representative of the Commercial Exchange and the Johannesburg Chamber of Commerce, has been appointed and is known as "The Merchants' Standing Committee on Imported Mining Supplies," and consists of the following, viz.:—Messrs. C. H. Leake, R. Niven, A. MacDonald, B. Bilbrough, V. Kent, W. A. Martin, R. H. Philpot, F. C. Sturrock, and W. Wolstenholme, for the purpose of negotiating with the Director of the Central Buying Department of the Chamber of Mines from time to time upon questions which arise out of the pooling system for the supply of materials for mining purposes. A number of meetings of the Committee have been held, and an interview has already taken place with the Director. According to the last monthly report of the Chamber, the establishment of the Committee has been found to be beneficial both to the merchants and also to the Central Buying Department.

* * * *

State Mines Progress.

According to the quarterly report of the Government Areas for the period ended June 30, there was an increase of 17,400 tons in the quantity of ore milled as compared with the previous quarter. The grade showed a slight improvement, and working costs were fractionally lower. The gross profit showed an increase of £17,728. The development footage sampled totalled 5,520 feet, and gave the following results:—Payable, 4,320 feet, having an average value of 12·2 dwts. over 54 inches of reef. Reef partly exposed, 80 feet, having an average value of 4 dwts. over 90 inches. Unpayable, 1,120 feet, having an average value of 3·9 dwts. over 33 inches. The payable ore reserves were increased during the quarter by over 400,000 tons, and the reserves are now estimated to amount to 5,488,000 stoping tons. Good progress has been made with the additions to the air compressor plant. The two machines at the north-west shaft were brought into use during the quarter, and it is anticipated that the two compressors being installed at the south-east shaft will be completed during August. Work on the remaining two compressors, which are being installed at the south-west shaft, is not so far advanced, and the machines will probably not be running until towards the end of the year. When the whole of this additional plant is in operation, it is intended still further to increase the development footage, and in addition it is hoped to put the underground work of the mine very largely on day shift.

TOPICS OF THE WEEK.

INDUSTRIAL DEVELOPMENT.

The industrial awakening of the country to the opportunities created by the war proceeds apace. During the week several events contributed to call public attention to the subject; and, since its importance cannot be over-emphasised, no apology is needed for enumerating them. First, there is the important pronouncement made by the Secretary for Mines and Industries, Mr. Warington Smyth, at the meeting of the Farmers' Union this week. Mr. Smyth referred to the advance of the iron and steel industry of the country, and, in this connection, we may call attention to the last of the series of articles on the Pretoria iron-ore deposits, appearing in this issue. These articles are of a very practical nature; the summary and conclusions of the authors, Prof. Stanley and Dr. Wagner, are full of encouragement; and a modest beginning to the industry in Pretoria seems now assured. Being opposed on principle to the further encroachment of the State on the sphere of private enterprise, we can hardly be expected to welcome the announcement that the Government is again about to invade the newspaper publishing field. It is a poor return —not without a touch of irony—to the Press for its unwavering championship of local industries, its preaching of the value of research and the need of State aid, thus to invade its own province with State competition at a time when the latter could well be done without. In point of fact, the Press has always shown itself only too anxious to give space and prominence to everything connected with the development of local industry. This is well illustrated by the prominence given this week to the report of the British Trade Commissioner in South Africa, Mr. W. G. Wickham. In another part of this issue we print Mr. Wickham's very sound advice to the British manufacturer in regard to the South African market; and here some of his remarks on local industries may be noted. "South Africa," says Mr. Wickham, "has progressed such a short distance along the road of industrial development that the country is probably worse placed than any other Dominion for utilising its own resources. It is hardly an exaggeration to say that there is no engineering industry in the country. The operations of the iron foundries, such as exist, are almost entirely confined to repairs and replacements mainly in connection with the gold mines; and engineering establishments similarly deal with repairs and erection of imported machinery. There are now two rolling mills, one of which is successfully coping with a seriously felt want in light rails, of which enormous quantities are used by the mines; but even these are at present dependent for raw material on scrap iron and steel, chiefly obtained from the railways. The war has made it even more difficult to obtain machine tools than industrial machinery, so that it has not been possible to make a start, for which such an excellent opportunity presented itself, in engineering works such as locomotive building. Apart from mining there is an exceedingly limited demand for machinery. Power is at present very little used by the farmer or pastoralist in South Africa as compared with Australia or New Zealand, and the importation of small gas and oil engines for use on farms is exceedingly small." Mr. Wickham also calls attention to the necessity for capital outlay, and particularly the expediency of the employment of local capital in industrial development; and this brings us to the financial question, and the extent to which it is likely to be solved by the new Industrial Development Company which has been formed with the backing of the South African mining houses and the banks. A report on the first year of the working of this new and promising undertaking will doubtless be published in due course; and, in the meanwhile, attention may be drawn to the programme of its great prototype, the British £10,000,000 Trade Bank, the prospectus of which is now out. The new British institution is described as, in effect, a scheme designed to meet the wants freely expressed in recent years for an institution to fill a gap in the financial system that the present joint-stock banks, with their large deposits, are unfitted to undertake, and to provide the commercial and trading community with facilities similar to those provided by Continental banks to their customers. As the prospectus points out, it will provide financial facilities the currency of which may extend over a longer period than is covered by the usual advances made by bankers, and it will be prepared to assist in opening up new channels for enterprise where it is demonstrated that financial aid can be afforded without undue commercial risks. Attention is further drawn to the fact that there exists to-day no large British financial institution possessing an industrial department or an organisation for study and research into new ideas or inventions, which is specially equipped to examine and nurse new schemes or developments until sufficiently proved and ripe for public investment. The Corporation will make this a special feature of its business, and will aim at becoming a link between British industry and the British investor. It will take a lead in the formation of syndicates to deal with business of promise and importance, and it will associate with itself other banking and financial institutions which care to participate in its operations. An important part of the business to be undertaken is thus referred to: "The corporation will establish information bureaux to collect reliable data upon openings for foreign trade, new contracts, State and other loans, and issue proposals, and generally upon all matters relating to foreign trade and the status of merchants and traders. As a result of the information thus gained, it will be in a position to determine what particular schemes it will be desirable to promote and support." To what extent, and with what measure of success, the South African institution will undertake a similar responsibility towards local industries remains to be seen. At any rate, it is bound to help materially in the present great industrial awakening of the Union.

Mashonaland and Rhodesia Railways.

The reports of the Mashonaland Railway Company and of the Rhodesia Railways for the year ended 30th September last both exhibit greatly improved results as compared with the preceding period, though earnings are still considerably below the pre-war standard. The Mashonaland's gross receipts went up from £518,700 to £631,700, and notwithstanding heavier expenditure the net revenue at £350,700 is £101,400 higher. The chief gain was on the Kalombo-Broken Hill section, where the volume of traffic continues to expand owing to the business secured from the copper mines of the Belgian Congo. The balance available at net revenue account, including the Beira rent charge of £42,500, is £311,500, as compared with £222,800, against which are debenture and other charges, including £25,300, as against £24,000, for rolling stock renewals, amounting to £328,800, as compared with £319,800. There is thus a deficit of £17,300, which raises the total debit balance to £1,439,800. The deficit for 1914-1915 was £97,000. The Rhodesia's gross receipts aggregate £937,600, as against £794,600, there being a very satisfactory advance in freight earnings through the greater tonnage of copper, chrome ore, coal and coke carried. Operating expenses were not very much higher, and the net revenue, after allowing for certain adjustments in respect of transit business, comes out at £575,100, a gain of £165,600. The net revenue account yields a surplus of £205,200 after meeting debenture charges, transferring £20 000, as compared with £20,600, to permanent way renewal account, and £36,200, as against £30,900, to rolling stock renewal account, and paying £48,000, or £22,000 extra, as income tax. The surplus for 1914-15 was £58 200. The year's profit added to the sum in hand makes a total credit balance of £383,100, which the directors propose to carry forward, deeming it prudent to keep as much money in hand as possible to finance work now postponed, but which it is very desirable should be undertaken directly conditions permit. The traffic returns for both systems for the first six months of the current year show that the improvement exhibited in 1915-16 has since been well maintained.

BRITISH TRADE WITH SOUTH AFRICA: REPORT OF H.M. TRADE COMMISSIONER.

A REPORT on the trade of South Africa for the years 1915 and 1916 by Mr. W. G. Wickham (H.M. Trade Commissioner in South Africa) has just been published.* In the course of the Report, after dealing with the character of the import trade of the Union, the effect of the war upon imports, the growth of foreign competition during the last two and a half years, and general business methods, Mr. Wickham goes on to advise United Kingdom firms of the steps that they ought to take *now*, notwithstanding the difficult circumstances in which they are placed, in order to retain their hold upon South African markets, and to make it more easy for them to resume their trade, and to extend their business, on the termination of the war. Mr. Wickham writes that, so far, the South African has had little opportunity of judging what, if any, developments have taken place in manufacturing in the United Kingdom, and that local firms have not been overwhelmingly impressed with the little they have seen. Whatever British manufacturers are going to be able to do in the direction of capturing or recapturing the South African market, they must realise that the campaign is still in front of them. No doubt they are not, and will not be for a while longer, able to deliver their goods or even to show catalogues and prices. There is, however, very much that they can do and ought to do. Firms should keep alive the goodwill of their connections by advertising and by explaining their actual position and temporary difficulties as fully as is permissible in the existing circumstances. The fullest consideration should be given to the difficult position of agents. A good agent is as valuable an asset to a manufacturer as any unit in his manufacturing organisation, and his services should be retained as a matter of course, as much as those of a manager or chief clerk would be in a period of strike or bad trade. Manufacturers who have paid no retaining fee to an agent, merely because they could not deliver goods to his indents, have little claim on an agent's loyalty, and, in Mr. Wickham's opinion, have no right whatever to expect him to come back to them, and throw over American and Japanese agencies, after the war. To firms who have not yet interested themselves in the South African market, but intend to do so after the war, Mr. Wickham suggests that they should make up their minds that the time for action is *now*. In spite of pre-occupation or shortness of staff they must realise that the matter will not admit of postponement. In the majority of lines firms can, through the medium of the Department of Commercial Intelligence of the Board of Trade, get into touch with reliable agents who are willing to wait for deliveries, provided they have agencies ready to come into operation as soon as the war is over. In this connection, Mr. Wickham offers the following advice to all who are intending to do business in South Africa when munitions are no longer wanted, alike to those who are only temporarily kept out of the market, and to those who desire to enter it for the first time:—"We at a distance have difficulty in obtaining information as to what is being made for war purposes which has a permanent value as a commercial requisite for civilian use after the war; as to what British manufacturers have learnt to make since the outbreak of war; and as to what they can make, are making, or intend to make of the many things wanted in South Africa and at present unobtainable or being procured from foreign sources. So far as is possible or permissible the fullest information should be given on these points, because the importer and consumer have nothing to judge from, except present inability to get what they want from the United Kingdom. It cannot be emphasised too often that, rightly or wrongly, the British manufacturer generally has a reputation for refusing to get out of grooves and make what is wanted. . . . Whether British manufacturers have been unduly conservative in the past or not does not signify, provided they will make it perfectly clear without delay that they are *not in grooves now*. Let them, so far as is allowed, prove the assertion with samples, with illustrated catalogues, or merely with statements of facts. . . . If facilities are given for any organised exhibition of goods in South Africa or in the United Kingdom, manufacturers should not fail to take advantage of the opportunity, and show, so far as possible, something more than fancy leather goods, colour printing, and toys. People want to know whether we are going to continue to confine artistic design to expensive handicrafts, or allow it to be reproduced as cheap repetition work; in fact, they want some tangible evidence, however small, that the whole of our commercial reorganisation is something more than talk. So much for the question of what we can make. Equally important is the question of *price*. Organisation and federation in industries to cheapen production by increasing the scale of manufacture are, of course, long overdue, particularly in certain branches of engineering. . . . It is essential that any organisation or federation should realise that it has got to mature its selling policy in addition to effecting economies in manufacture, and that this can only be carried out by the study of experts in the oversea market itself." From the point of view of the British engineer, adds Mr. Wickham, it would be extremely unwise to wait until works are released for the production of commercial commodities, and the goods are ready for delivery, before beginning to look into the question of how best to market them. Here, again, the time is the present. Other sections of Mr. Wickham's Report deal with industrial conditions in South Africa, the necessity for capital outlay, labour, agriculture, dairy produce, mining, railways and harbours etc. Appended to the Report are reports by the Imperial Trade Correspondents at Port Elizabeth, Durban, Bloemfontein and Bulawayo, together with a report on mining conditions in the Transvaal.

*Obtainable either through any bookseller, or directly from H.M. Stationery Office, the reference number being Cd. 8,614, and the price 3d. (4d. inclusive of postage).

Goerz & Co.: Reduction of Capital.

The reduction of the capital of Messrs. A. Goerz & Co., Ltd., from £1 400,000 in 1 400,000 ordinary shares of £1 each to £875,000 in 1,400,000 ordinary shares of 12s. 6d. each has been confirmed by an Order of the Supreme Court of South Africa, Witwatersrand Local Division, and duly registered in terms of law.

Victoria Falls and Transvaal Power.

The directors of the Victoria Falls and Transvaal Power Company, Ltd., have declared the following dividends: Preference shares, final dividend of 4 per cent., less income tax, making 10 per cent. for the year 1916; preference shares, a dividend at the rate of 6 per cent. per annum, less income tax, in respect of the six months to June 30; ordinary shares, a dividend of 5 per cent., less income tax, for the year 1916.

THE IRON ORES ON THE PRETORIA TOWN LANDS.—IV.

[By G. H. Stanley, A.R.S.M., F.I.C., M.I.M.M., M.I.M.E., and P. A. Wagner, Dr.Ing., B.Sc., F.R.S. (S.A.), M.A.I.M.E.]

Possible Methods of Treatment.

As already mentioned, only the timeball and clayband ores are worthy of exploitation. Of the former, three samples were sent by the Town Engineer for testing, respectively—(1) From Groenkloof Road, near Walker Street; (2) Crushed stone from Fountains Valley reef; (3) From Fountains Quarry. Complete analyses of (1) and (2) have already been given and show that the ore is highly siliceous, and since every unit of silica requires over three units of limestone flux, the direct smelting of such ores, in spite of the high iron content, is likely to be relatively expensive. Smelting cost could doubtless be reduced by removing waste and so concentrating iron in the ore, the only method so far commercially successful being magnetic concentration; and although this Pretoria ore differs in character from those successfully dealt with elsewhere in (1) that the grains of mineral are much smaller and more finely disseminated, and (2) that the iron mineral is mostly ferric and not magnetic oxide (martite), it was felt that this method offered the greatest prospect of utility. A large number of tests were therefore carried out under varying conditions as regards fineness of crushing and grading, strength of magnetic field, and both wet and dry; and as magnetic treatment alone gave unsatisfactory results, this was combined with gravity concentration on a Wilfley table. The tests and results obtained are shown in tabular form in the accompanying sheets, and although it was found possible to effect some enrichment, the improvement was in no case sufficient to justify the cost of such treatment, this being due to the physical characteristics of the ore to which reference has already been made. It therefore appears that these ores can only be treated by smelting direct, fluxing off the silica by a rather large amount of lime. It appears to be possible by selective mining to obtain from the deposits a large proportion of smelting ore assaying approximately 48 per cent. iron and 18 per cent. silica. This amount of silica is by no means prohibitive, more especially as the ore contains alumina and small amounts of lime and magnesia, which flux some of the silica and leave only about 10 per cent. to be fluxed by added limestone. So that with a good quality limestone not more than 36 per cent. should be required. With the magnetic concentrate obtainable from this, 25 per cent. of limestone would be necessary, so that the saving per ton of ore would be only 10 per cent., or 3s. 9d. per ton of iron. The cost of concentrating, and briquetting the resulting concentrate would probably be at least three times this (per ton of iron) and therefore, as previously stated, the possibility of effecting any improvement in this manner must be dismissed. As already indicated, this ore would require 35 per cent. of limestone to make a monosilicate slag; but in iron smelting it is endeavoured, if possible, to minimise the amount of flux required by mixing various ores of different compositions so that a more siliceous ore is more or less fluxed by one of more basic character. In this connection the clay-band ore could be made use of, and by mixing ores of the compositions of sample (1) and the clay-band in equal proportions the mixture would then only require the addition of 20 per cent. of good limestone, and with three parts clay-band to two parts silicious the minimum flux requirement, 15 per cent., is reached. With limestone at 15s. per ton, this would effect a saving of 6s. per ton of iron, while the increased cost of ore should not exceed 2s., a net saving of 4s. At the same time the capacity and output of the furnace would be somewhat increased, while the phosphorus content of the iron would still be satisfactory for foundry purposes. The clay-band ore would be almost as difficult to smelt by itself as the siliceous, since the gangue is almost entirely silica and alumina and would require both lime and silica to be added to obtain a fusible slag. The cheapest and most obvious source of silica would be the siliceous ore as already indicated. As it would be possible to smelt either ore, or preferably a mixture of them, it remains to consider whether the necessary flux and fuel are available. For flux limestone is employed and should be as free from silica as possible; this is available in quantity from Taungs and Potgietersrust, and some of the local dolomite, where sufficiently low in silica, might also be employed. The price of the two former, in Pretoria, would be about 15s. and 13s. 6d. per ton, and they are both low in silica, about 1 per cent. and 1·5 per cent. respectively. Fuel presents more difficulty; coke can be obtained of sufficient good quality from Natal, but at present is very expensive, about £4 10s. per ton, though this could probably be lowered considerably if the demand were sufficiently large. It is not made at all in the Transvaal as yet. In this country, however, charcoal is cheaper than coke and could doubtless be obtained of very good quality with suitable methods of burning. It is estimated that 200,000 tons of wattle timber is annually burned to waste in Natal which could furnish about 40 000 tons of charcoal. Considerable supplies could be obtained from plantations in the neighbourhood of Pretoria, *e.g.*, the Municipal plantation at Groenekloof, at a cost probably not over £2 10s. or £3 per ton. Moreover, charcoal produces a purer and better quality of iron than coke, and the amount consumed per ton of iron is less, and so also is the amount of flux required. It therefore appears to be the best fuel to employ. The size and output of a proposed smelting works would of course be regulated by the market requirement. Before the war, probably between one and two thousand tons per annum of pig iron was imported for foundry purposes, and in addition the mines of the Transvaal alone imported (in 1913) 3,500 tons of iron castings. Owing to the war, and consequent difficulty of importing machinery, a greatly increased amount of machinery is being made in this country, and this practice being now established, is likely not merely to persist, but to be progressive even after the war. At present expansion is hindered by scarcity of the necessary pig iron, some foundries having no supplies in sight, and scrap cast iron is also very scarce and difficult to obtain. The same state of affairs is becoming apparent in connection with steel, at present produced almost entirely from scrap metal, and in consequence a market may be anticipated in this direction too. If the pre-war foundry requirement be only regarded as doubled and only 50 per cent. added for steel manufacture, a yearly total approaching 5,000 tons is obtained (or, say, 100 tons per week), and very probably this might be doubled. If, however, attention is paid to the very large annual total requirement of steel, an immensely larger field is opened up, the value of iron and steel under the heading of raw material imported in 1913 approximating £946,000, besides nearly £5,000,000 worth of manufactured goods, machinery, hardware, etc., of which iron and steel constitute a large part. The manufacture of steel at Pretoria, however, would scarcely be feasible in the immediate future, on account of the high cost, or even the impossibility, of obtaining the necessary plant. For the present the manufacture of pig iron only will be considered, though it may shortly become feasible to convert a considerable tonnage to steel in small electric furnaces, electrode manufacture being under contemplation. In Sweden, the United States and Austria

charcoal is used in smelting iron in small blast furnaces up to about 40 feet in height and employing about 1 lb. blast pressure. The output is dependent on the cubic capacity and other factors, varying from ten to twenty tons per day, with fuel consumption about one ton, more or less, per ton of iron produced. The plant employed is relatively simple, as the blast is seldom strongly heated, and it would appear to be quite feasible to construct such a plant locally, assuming, as is probable, that the required blast apparatus could be obtained, at a cost of less than £12 000. Working cost on this small scale would necessarily be somewhat high, judged by oversea standards, but some of the high costs are offset by the low price of the ore, and it would be possible to run the plant, with an output of 10 tons per day, at a cost of about £6 10s. per ton of iron, neglecting interest and depreciation. The pre-war price of good quality pig iron here was about £8 or £9 per ton, and at present it approaches £25. High prices are likely to rule even for a long time after the war ceases, and therefore iron smelting as suggested offers the prospect of being a very profitable enterprise.

SUMMARY AND RECOMMENDATIONS.

(1) A very considerable tonnage of iron ore of good quality is available on the Pretoria Townlands in the so-called "clay-band" and an enormous tonnage of somewhat lower grade silicious ore in the Timeball Hill beds. (2) The clay-band ore is undoubtedly worthy of exploitation, and while the Timeball Hill ironstone is not amenable to concentration, the better grades of this material can also, in our opinion, be smelted at a profit, especially if mixed with the clay-band ore. (3) As a preliminary to the exploitation of the deposits, we consider it essential that they should be opened up at regular intervals by trenches and prospecting pits and systematically sampled under careful supervision, in order to determine where the best values and widths are situated, and also in the case of the clay-band, to enable a reliable estimate of the tonnage of workable ore to be made. The information obtained would also be invaluable when deciding upon the most suitable site of the suggested smelting works. (4) Having regard to present conditions, the smelting of these ores on the small scale should be technically and commercially successful, and the erection of a small blast furnace burning charcoal and capable of producing, say, 100 tons of iron per week is recommended as being the best and quickest way of turning the ores to account. The capital cost should not exceed £12,000, and the working cost would be about £6-£10 per ton, while the selling price would be two or three times this figure. There are good prospects that this small beginning would eventually expand into a large iron and steel industry.

PERSONAL.

Mr. Isaac Lewis has been on a visit to Rhodesia.

* * * *

The death occurred at his residence, the Chatsworth Gardens, South Cliff, Eastbourne, England, on Sunday, August 5th, of Mr. Charles Edward Atkinson, J.P., a very old and esteemed member of the Board of Directors of De Beers Consolidated Mines, Ltd., The deceased gentleman was a merchant in South Africa for many years, and acquired interests in the diamond mines in the early days, which led to his association with the great corporation of to-day. He was prominently connected with the old Kimberley Central Company, which eventually became absorbed in the De Beers Consolidated Mines, Ltd. He was appointed a director of the present company on December 21, 1888, the year of the big amalgamation, and he has been an active member of the Consultative Committee of the company in London ever since.

ANSWERS TO CORRESPONDENTS.

All enquiries addressed to the Editor must bear the writer's name and full address. We cannot reply to enquiries by letter, but telegrams with replies prepaid will be answered. Correspondents are requested to write their names and pseudonyms distinctly.

"J." (Kimberley).—Reply sent by post.

"W. H. B."—(1) No. (2) 10 per cent.

"C. H. Erskine" (Filabusi).—The addressee is dead, and your letter is therefore returned.

"H. O'C."—Write to the Union Steel Corporation, Vereeniging.

"Elandsfontein."—Tenders must be in not later than September 30.

"Hopeful."—Nothing will be done till the war is over. It is true that some of the plant has been disposed of.

"S. E."—There are 35 enemy businesses in the Union, of which ten have been ordered to be wound up, eight are in voluntary liquidation, five are being controlled and the remainder are still under consideration.

"Investor" (Krugersdorp).—Your list is excellent as far as it goes; but we should omit your last and add State Mines, Springs and the Modder group.

"Novice" (Queenstown).—Your selection can hardly be improved upon.

"W. G. S." (Pretoria).—No separate returns are published, but we will endeavour to obtain the desired particulars from the Mines Department.

THE WEEK IN THE SHAREMARKET.

More Business, but Market Waiting Payment of Dividends.

THERE has been more business during the past week, but the usual improvement in prices with an increased turnover has been very small. Market operators are fond of saying there is nothing to go for, but with the distribution, now imminent, of the last half-year's dividends, they are likely to find promising stocks which offer sufficient attractions. As it is the market seems to have been struggling hard to get away, but so far has not managed it, for which failure probably a number of causes are responsible: shortage of native labour, high prices of mining material with consequent rise in working costs, unsettled questions in dispute between the white workmen and the Chamber of Mines, and a market very well supplied with scrip, are all no doubt factors in the matter. The attractions of several of the Far East Rand stocks have led to the liquidation of holdings in companies out of the fashionable quarter. Last week the Modder East shares and options were issued to the market, and yesterday they were both officially quoted for the first time when they received a cordial welcome accompanied by largely increased dealings. Springs and State Mines have been as usual largely dealt in, Springs to an unusually large extent, with also the now accustomed fluctuations, and both stocks were higher for the week. Van Ryn Deeps were also more steadily bought and were also somewhat better. Kleinfonteins were a better market, though the highest point, 18s. 9d., was not maintained. Rand Selections and Brakpans both improved on very small business to a slight extent. City Deeps were unchanged for the week. Modder Deeps and Modder Bs. were bought in small quantity, and both were a little higher. Stocks such as Wit. Deeps and Knights Deeps showed further declines, and Consolidated Langlaagtes also declined on small liquidation. Of the lower priced stocks Southern Van Ryns showed a marked decline to 9s. on the sale of a fair number of shares. Diamonds have been quiet, except Monteleos, which were sold at from 35s. down to about 30s., but had yesterday recovered and advanced to 38s. 9d. on quite moderate business. Tin stocks have been uninteresting, with restricted business. The bulk of the business has continued to be professional and has been in the main confined to less than a dozen stocks.

* * * *

Friday morning.—State Mines were the best feature of a market inclined to be rather weaker, and were higher at 63s. 3d., sales and buyers. Springs were firm at 60s. 6d., also City Deeps at 73s. 6d., but Geduldss were a weak spot at 35s. sales. Consolidated Langlaagtes relapsed badly to 17s. 6d. sellers, with no buying bid over 15s. Modder Easts declined to 19s. 9d. sales, and Rand Klips were a little lower. Sub Nigels and Van Ryn Deeps were easier. The Modder stocks were inactive, but New Modders seemed easier. Leeuwpoort Tins fell away considerably to 11s. sellers.

* * * *

	Fri., 10th.	Sat., 11th.	Mon., 13th.	Tues., 14th.	Wed., 15th.	Thurs., 16th.
African Farms	7 4*	7 9†	7 7*	7 6*	7 6†	7 5
Apex Mines	-	6 0*	6 3†	6 0*	6 0*	6 0*
Aurora Wests	14 6†	—	14 0†	—	14 0†	—
Bantjes Cons.	2 5*	2 6*	2 6*	2 6	2 4*	2 6†
Brakpan Mines	97 0*	100 0	—	101 0*	101 0*	—
Breyten Collieries	—	—	—	—	15 0†	13 6†
Brick and Potteries	—	5 0*	5 0*	-	5 0*	—
British South Africa	10 0*	10 0*	—	—	—	10 0*
Buffelsfontein Tins	—	—	0 3†	0 3*		
Cassel Coals	27 6†	23 0*	25 3†	22 6*		—
Cinderella Cons.	—	—	—	—	—	4 0*
City and Suburbans	25 0†	24 9†	24 6†	24 3†	24 0†	23 9*
City Deeps	73 0*	73 0*	73 6	73 6*	73 0*	73 0*
Cloverfield Mines	8 6*	8 10*	9 0	8 9*	8 1*	8 9
Clydesdale Collieries	11 0*	—	—	11 3*	11 6*	11 3*
Concrete Construction	1 0*	1 0*	1 0*	1 0*	1 0*	1 0*
Cons. Investments	18 0†	—	—	—	—	—
Cons. Langlaagtes	19 0*	19 0*	19 0*	19 0*	19 0	18 0*
Cons. Main Reefs	15 0†	14 6*	14 6*	14 6*	14 6	14 6
Cons. Mines Selection	23 6*	23 9*	23 6*	24 0	23 6*	23 9*
Coronation Freeholds	—	—	—	—	0 3†	—
Daggafontein Mines	23 0	23 0	22 0*	22 9	22 6†	21 9*
Durban Roodepoorts	15 0†	15 0†	15 0†	—	—	—
East Rand Centrals	11 0*	—	11 0*	11 6*	11 6*	11 6
East Rand Cons.	1 10*	1 10*	1 10*	1 10*	1 10*	1 9*
East Rand Deeps	0 10*	0 10*	0 10*	0 10*	0 10*	0 10*
East Rand Mining Estates	11 3*	—	—	—	—	—
East Rand Props.	5 6*	5 6*	5 6*	5 6*	5 6*	5 6*
East Rand Debentures	£62*	£62*	£62*	£62*	£62*	£62*
Eastern Gold Mines	1 0*	1 0*	1 0*	1 0*	1 0*	1 0*
Frank Smith Diamonds	3 5	3 3*	3* 4*	3 6*	3 7	3 6*
Geduld Props.	35 3*	35 6	35 9	35 6*	35 0*	35 0*
Ginsbergs	7 6†	-	-	-	—	—
Glencairns	1 3*	1 6*	1 0*	1 6*	—	1 6*
Glencoe Collieries	9 0*	9 0*	10 0†	10 0†	—	—
Glynn's Lydenburgs	16 0*	16 0*	16 0*	16 6*	16 6*	16 6*
Government Areas	62 9	62 6	61 9*	62 6	62 6*	62 6*
Jupiters	3 9*	3 9*	3 6*	3 7*	3 6*	4 0†
Knight Centrals	3 0*	3 0*	3 0*	3 0*	3 1	3 1*
Knights Deeps	-	15 0†	-	—	—	5 0*
Lace Props.	4 1*	4 0*	4 0*	4 0*	4 3†	4 3†*
Leeuwpoort Tins	—	11 0*	—	12 0*	12 0*	12 0†
Luipaardsvlei Estates	4 0†	—		—	—	—
Lydenburg Farms	6 7*	6 8*	6 8*	6 9	6 6*	6 9
Main Reef Wests	3 0*	3 3*	3 0*	3 0*	3 0*	3 3*
Main Reef West Debs.	£45†	-	£40*	—	£40*	—
Meyer and Charltons	—	—	—	—	—	97 6*
Middelvlei Estates	—	1 0*	—		—	1 0*
Modderfontein B.	148 6*	148 0*	150 6	150 0*	—	152 6*
Modder Deep Levels	133 0*	132 6*	132 0*	131 6*	134 0†	133 0
Modder Easts	—	—	—	—	—	20 4½
Modder Options (3 years)	—				—	8 3
Modder Options (4 years)	—	—	—	—	—	8 4½
Natal Navigation Colls.	18 0*	19 0*	19 0*	19 0*	19 0*	19 0
National Banks	—	£12*	£12*	£12*	£12*	£12
New Boksburgs	—	1 6†	—	—	1 6†	—
New Eland Diamonds	25 0*	25 0*	25 6*	25 0*	26 0*	26 0*
New Era Cons.	9 0*	—	9 3†	8 10*	9 0	9 3†
New Geduld Deeps	6 3	6 6†	6 0*	6 0*	6 0	6 0*
New Heriots	31 0*	32 0*	—	—	—	31 6*
New Kleinfonteins	18 0	18 3	18 3	18 6*	18 9	18 3
New Modderfontein	£20½A	—	£20½A	£20½†	£20½†	—
New Rietfontein	1 0†	—	—	1 0†	1 0†	0 6*
New Unifieds	10 0†	10 0†	10 0†	10 0†	—	8 9*
Nigels	3 3*	2 3*	—	3 0*	3 6†	—
Nourse Mines	19 3*	19 6*	19 9*	19 6*	20 0*	20 0
Pretoria Cements	90 6*	92 0*	92 0*	94 0*	94 0*	92 6*
Princess Estates	—	—	—	—	1 0*	1 0*
Rand Collieries	2 6†	2 6†	2 6†	2 2*	—	2 1*
Rand Klips	9 6	9 6*	9 9*	9 7*	9 7*	9 8*
Rand Nucleus	1 3*	1 3*	1 4*	1 3*	—	1 3*
Rand Selections	74 0*	74 0*	74 0*	75 0*	74 6*	74 6*
Randfontein Deeps	4 0*	4 3*	4 0*	4 6*	—	4 3*
Randfontein Estates	12 6*	12 6*	12 6*	12 9	12 6*	12 6*
Roberts Victors	—	—	—	—	—	7 6*
Rooiberg Minerals	9 3*	9 9	9 6*	9 1	9 3	9 3*
Shebas	1 0*	1 0*	—	1 0*	—	—
Simmer Deeps	1 9*	2 0*	2 0*	—	2 0*	2 1*
S.A. Lands	4 3*	4 3*	4 2*	4 4	4 3*	4 3*
Springs Mines	—	60 3	60 3	60 1½	59 9*	60 8
Sub Nigels	22 6*	22 6*	22 9*	23 0*	22 9	22 9*
Swaziland Tins	25 0*	27 0†	27 0†	27 0†	27 0†	27 0*
Transvaal Lands	10 0*	10 0*	10 0*	10 0*	11 0	11 0*
Transvaal G.M. Estates	17 0†	14 0*	—	14 0*	—	15 0*
Van Ryn Deeps	62 0*	62 0*	62 6	62 0*	62 6	62 6
Village Deeps	19 0*	20 0*	20 0*	—	—	—
Village Main Reefs	—	14 6†	—	—	—	—
Welgedacht's	22 6†	—	—	—	—	—
Western Rand Estates	1 9*	—		1 6*	1 6*	1 6
West Rand Cons.	6 0	6 0†	6 0†	6 0	—	—
Witbank Collieries	—	—	—	—	42 6*	43 0*
Witwatersrands	37 6†	37 6†		—	—	—
Wit. Deeps	7 0*	7 9*	7 6*	—	7 6*	7 9†B
Wolhuters	8 0†	7 6*	7 7*	7 6*	7 6*	7 6*
Zaaiplaats Tins	6 0*	6 3	6 3	6 0*	6 0	6 2*

Union 4 per cent. were quoted £82 16s. 9d. sellers, while Union 5 per cents. were quoted £102 5s. buyers.

*Buyers. †Sellers. AOdd lots. BEx London.

S.A. INSTITUTION OF ENGINEERS: PRESIDENT'S INAUGURAL ADDRESS.—I.

The following is the inaugural address of the new President of the South African Institution of Engineers, Mr. G. M. Clark, delivered at the last meeting:—

Those of you who were present at last month's meeting when I took the chair will remember that though then was the time when a presidential address is usually delivered, it was physically impossible for me to do so, both by reason of the short notice at which I took the chair and also on account of having no voice of my own. As a presidential address is one of the few opportunities when one can occupy the pulpit, so to speak, for an hour or so and speak freely without fear of subsequent discussion, an absence of voice is of greater importance than an absence of material—to the President at any rate, though the opposite may be the case to his audience. I was then only able to thank you, and I do so again now, for the honour that you have done me in electing me as your President, and to express the hope that I will be able to forward the interests of the Institution during my term of office. It may be felt by some who have known of my long connection with the Victoria Falls Power Company that in following Mr. Bernard Price in this chair "An Amarath to Amarath succeeds." Some people, however, do not like Amaraths, or at any rate not too much of them. If there are any such here they may be comforted by hearing that for the purposes of the contested election I offered Mr. Kirkland the choice of colours. He chose a good constitutional blue, leaving to me the red badge of courage or of revolution, which you will. In many ways I would have been glad to congratulate Mr. Kirkland had the wheel of fortune revolved but one more spoke in his favour, for I have known Mr. Kirkland for many years, and I feel sure that he would have filled the office of President admirably. Perhaps if, at the end of the year our vice-presidents are still so coy, it may be my honour to induct him into this chair. Anyhow I hope that he will go into training for the office and be a good and regular attendant at council meetings. I say this seriously, for it is very necessary for a president to be closely in touch with the current affairs of the Institution. Such being the case, I feel that some apology and explanation should be forthcoming from myself for the poor attendance that is recorded against me for the last year. One of the things that one discovers, especially after a certain age, is the limitation of human faculties, chiefly of one's own, and I had other work on hand that made it impossible for me to attend many meetings of the Institution. Though a few years ago it might have been said that this particular work had nothing to do with engineering, I venture to think that our ideas have, within the last year or two particularly, received so many shocks and awakenings that even this work might be looked upon as coming within the purview of an engineer. The subject that I was interested in was that of education, and I was examining it not by way of its successes but by way of its failures, the scrap heap of civilisation as it is formed from the white youths of this country at the educational period. This way of looking at the subject is quite a legitimate one from an engineer's point of view. In looking round a manufacturer's works it is no bad thing to look at the scrap heap. You are not generally shown this, but if you have the chance of inspecting it you may learn more than by looking at a direct exhibition of the things made. Again, the measure of success of any industrial process is the proportion between the credits and debits. A steam boiler, for example, is debited with so much energy in the shape of coal, and is credited on the other side of the account with the energy taken up by the water in the shape of steam. The ratio of this credit to the original debit is called the efficiency of the boiler as a steam generator. A boiler has further to be credited with other performances that are generally looked upon as losses. For example, it is to the boiler's credit that it acts as a radiator for heating surrounding objects in the boiler house. It is also to its credit that the gases formed by the products of combustion leave the boiler at a higher temperature than they enter it. The efficiency of a boiler as a radiator or as a gas heater, that is the ratio of these particular credits to the original debit, should be small and therefore a boiler would be a wasteful thing to use for these purposes. But these losses cannot be looked upon as dis-credits or debits against the boiler, they must appear on the credit side of the account. A poor credit cannot be a debit any more than a bad asset can be a liability. The sum of all the credits in any process must balance the original debit, and if only one credit is unknown it can be found as a difference between the debit and the sum of the rest of the credits. In any process involving physical measurements, it is always difficult, assuming that the debit is certain, to be sure that all the credits have been taken into account. It is therefore advisable to measure as many credits as possible and make the approximation to a balance a gauge as to the accuracy of each. Therefore we must examine failures as well as successes. In a simple boiler test, coal and water are measured, and from these the credit that is desired, namely, the evaporation and efficiency, is readily obtained. A more elaborate test involves the estimation of other credits such as those that I have already mentioned, the efficiency as a radiator or as a gas-heater. These are the next most important credits, though there are other things that a boiler may be credited with, such as a pump for drawing air through small holes in brickwork, or as an instrument for passing coal through a furnace on to the ash heap without suffering combustion. Fortunately in a well-tended boiler-house these latter efficiencies scarcely exist. If one is prepared to allow some small percentage, say 5 per cent. or 7 per cent., for these and the radiator efficiency, a boiler will remain with only two principal efficiencies, so that if either is known the other can be deduced. This is a particularly interesting example, for the measurements required are totally distinct for the two. As a steam generator the measurements required are coal and water, etc., but for the boiler as a gas-heater the measurements are a rise in temperature and an analysis of the gases by means of the proportion of carbon-dioxide present. In this latter case the measurements are almost instantaneous or at any rate take only a few minutes, whilst in the former, as is well known, they take as many hours. In the one case total quantities of coal and water have to be measured, whilst in the other case a rate—the loss per pound of coal—has to be determined. Whilst it is a good statistical axiom never to discuss rates without a knowledge of the total quantities on which they are based—for example a 50 per cent. death rate deduced from an experience of 1,000 cases of disease carries very different weight from one founded on two cases only, or again 10 per cent. on £100 is no more than 1 per cent. on £1,000; still the judgment must be used as to whether a rapid approximate method or a slower method that purports to be more accurate should be used. I have chosen this example where the credits can be reduced to two, not because it is the common case in engineering physics, but because it appears to be—I emphasise the word appears—the common case in human affairs. Classification into two seems to satisfy most minds, people are either white or black, Briton or Boer, musical or unmusical, successful or unsuccessful. But examination of any of these classifications shows that, in the functions that are measurable, there is an almost infinite series of gradations from one extreme to the other. This, however, is not so much the point that I wish to make as to call attention to the fact that many human qualities are not measurable or capable of being reduced to a formula. They are real things nevertheless and failure to appreciate them will lead to failure of the project just as surely as a miscalculation of the strength of a stay or a strut may lead to a collapse of a structure. Engineers are rather prone, I think, from the nature of their occupation, to deal too much with material things that do not matter rather than to take account of the immaterial things that do and thus study the human factors in the case that cannot be reduced to measures or a formula. There are of course many exceptions to this, but it seems fitting to me to give a warning as to the danger of the regimentation of industries that seems a fashionable after-the-war basis of reorganisation. Men can be led where they are free to follow, but the freedom that men look for is that of being capable of development in their multitudinous diverse ways, subject to the control of the privileges being reciprocal. The freedom is not that of the tongue-in-the-cheek orator whose idea of freedom is that he may be an autocrat himself. The time when for engineers a problem was largely how a thing was to be done, has passed away and the difficulty now is more one of selection from many methods each of which has some merits and none is capable of them all. The question in another form is not so much whether a thing can be done as whether it pays to do so. This whether-it-pays guide is rather a fallacious one unless it is applied with great care, for what a thing costs is seldom determinate in works that are not isolated, and very few operations are completely isolated, nor is the return at all accurately determinable either, for that depends on the area of the field of direct and indirect benefits that may be included, and these things are largely matters of judgment. The faculty of judgment is therefore one that an engineer must exercise, and because an engineer must exercise this faculty both of men and of things, perhaps to an even greater extent than he has to exercise inventive genius, an engineer becomes well qualified to deal with many human problems. I would therefore like to see engineers taking a greater share in the administration of affairs in the future than they have done hitherto. Every profession has its own bias, but I feel sure that a proper leavening of the bias of the men who make and do things and have to form their judgments on unknown or imperfectly known factors, would form an excellent corrective to the professional bias which knows more about what human beings and affairs ought to be than what they are. I do not think that we should find quite so large a scrap heap or quite so much valuable material thrown away upon the dumps of human wreckage if we brought more of what things are and less of what things ought to be into the consideration of human affairs. At any rate that is the conclusion that I have come to from my work amongst the failures of the educational system. Naturally as every engineer knows, it is much more difficult to effect recovery from the dumps than it is at an earlier stage before the dump has been reached. An improvement of the earlier stages of the process is what we want rather than a re-treatment of the scrap heap once it has been formed. Was I occupied in engineering or was I not when I was absent from the council meetings last year? I do not believe that the knowledge of things that are in any way limits the formation of ideas as to the way that things ought to be. In fact it is very much the other way, and the engineer is quite as well equipped as the members of other professions to formulate ideal standards both in the region of his own mechanical and dynamical devices where measurements and formulæ are all important, as he is in the region of the relation of men to each other and the formation of aggregates of human activity. Engineers are certainly no narrower in their interests than other professional men, for the lives of the more eminent of them show them to have been of particularly wide interests, not confining themselves to the art and science of mechanics only, but interesting themselves in other arts and sciences as well. One is tempted to state the paradox that the engineer who is only good at his profession is good at nothing, not because the profession is nothing, but because he is supported on too narrow a base to remain in stable equilibrium when displacements occur.

(To be continued.)

Engineering Notes and News.

THE ELECTRIFICATION OF A GREAT RAILWAY.—I.

[By J. W. KIRKLAND, M.Am.I.E.E.]

THE purpose of this paper (perhaps better described as a lecture) is to bring to the knowledge and consideration of the Institute the engineering features of electrified sections of the Chicago, Milwaukee and St. Paul Railway in the United States. This electrification is remarkable in several respects. First, it is by far the largest and most important existing application of electricity to main line railway operation; second, it employs the highest direct current voltage thus far practically applied; and third, it employs for the first time successfully, and on a large scale, regenerative braking. Financial matters as regards first cost are only mentioned incidentally, because the costs of to-day and those of pre-war days are far apart, and little valuable and practical information could now be gathered from the actual costs of the system. Also, the financial results of the electrification are not stated, except with respect to power cost, because they are still unpublished history, locked in the archives of the railway company until time shall have winnowed all the facts. Suffice it to say that the ascertained economies are highly satisfactory to the owners, as evidenced by the recent decision to add greatly to the system as referred to later on. I might also add that the discussion of the engineering features is quite large enough for any one paper. But I hope to bring before you some of the considerations which lead to this great undertaking and to point to the *causes* of the economy which its owners confidently expect, and which experience has already indicated as amply assured. By way of further preamble, I may say that it was my good fortune one cold winter evening early in January of this year to walk forward alongside a Chicago, Milwaukee and St. Paul railway train at the little station of Harlowton, Montana, to where the great electric locomotive had been coupled on in place of the steam locomotive which had brought us thus far. A request addressed to the driver, who was inspecting the main journals, to be allowed to ride in the locomotive was granted with hearty goodwill, and I was soon seated in the cab of the locomotive, enjoying keenly the sensations of threading smoothly and swiftly the passes of the Rockey Mountains on board of the most powerful locomotive ever built. From that time until I returned over the same road some four days later, I had every opportunity to see and learn about the details of the system. What I have prepared has also been drawn, to a considerable extent, from the many valuable articles which have appeared from time to time in the scientific press. The Chicago, Milwaukee & St. Paul Railway is one of the four, and the latest of the great trans-continental railway lines which bind east to west in the United States. It extends from Chicago in the east to Tidewater in the west—at Seattle in the State of Washington. Westward it carries the manufactures of the east—and eastward it returns the rich raw products of the farms, mines and forests of the west. For the most part it is, like our South African Railways, a single track line and also like our main lines it consists of "high veld" districts and also of very rough mountain sections. It is these latter sections which have been electrified. This great railway is not laid out quite as the Czar of Russia is said to have laid out the line from Petrograd to Moscow—by drawing a straight line from one city to the other—but nevertheless a principle in its construction was that it would serve cities yet unborn rather than be made a zig-zag to serve settlements already in existence; a guiding principle was that population would follow the railway. We need only be concerned with that part of the railway which has been already electrically equipped, namely, that from Harlowton in Montana to Avery in Idaho—a distance of about 440 miles of main line. In connection with this are 142 miles of side track, also electrically equipped, making a total of about 582 miles. Four hundred and forty miles is, as you know, about the distance between Johannesburg and Durban, but I may add that within the last three months further contracts have been let which provide for the electrification of the line from Seattle eastward to a town called Othello—both in the State of Washington. Between Othello and Avery, a distance of about 280 miles, it is comparatively level, and it has not been considered desirable to electrify this section at this time. Returning to the main line already working electrically, it is to be observed that it crosses three large mountain ranges—the Big Belt Mountains, the Rockies (which form the great Continental Divide), and the Bitter Root Mountains. The deduction is obvious that the purpose of electrification was to open out the "bottle neck" of the mountains, of which the effect had been to limit the trans-continental carrying capacity of the whole railway system. This "bottle neck" was especially narrow in the severe winter weather which prevails throughout this section for three or four months every year. Previous to electrification, these mountain sections were served by Mallet steam locomotives of 278 tons weight (including tender), having a tractive force (maximum) of 76,200 lbs. Each electric locomotive weighs 282 tons and has a running tractive force of 85,000 lbs., and, at starting, 136,000 lbs. Two Mallets (one a helper) could handle on the grades trailing loads of less than 2,000 tons. Two electrics (one a helper) on the same service handle loads of 3,000 tons, at much greater speed. For example, at a certain division goods traffic which required with steam a schedule time of 10 to 12 hours is handled by electricity in eight or ten hours. The grades on these mountain sections are naturally very severe and long. For example, there are 21 miles continuous of 2 per cent. just before reaching the summit of the divide, and at another point there are 49 miles of 1 per cent. grade. Curves are also necessarily sharp—reaching 10 degrees maximum. The country is very rough and barren in these mountains, resembling in its grandeur some of the mountain passes in the Eastern Transvaal (Delagoa Bay line). From the summit the line descends westward to the thriving mining town of Butte, near where it crosses over the 2,400 volt electrified line of the Butte Anaconda and Pacific Railway (about 25 miles long) which has been in successful operation since 1915.

Power Supply.—The Chicago, Milwaukee and St. Paul Railway buys all of its power from the Montana Power Company—an independent company which has on various mountain streams of Montana 13 hydro-electric power stations in operation with an aggregate installed capacity of over 150,000 h.p. The largest of these plants is that known as Great Falls, where there is 60,000 k.w. of plant. But all of the generating plants are tied together through a 100,000 volt network, so that continuity of power supply is assured. The power is delivered and metered at seven points—located so as to feed where heaviest power demands are to be fulfilled. Furthermore, the railway company itself owns and operates a 100,000 volt line paralleling more or less closely the right of way, and most of the distance located on the right of way. The power company's lines are in part carried on steel towers and in part on wooden poles. The railway uses nothing except wooden poles. Suspension insulators (six in each group) are used throughout. This interconnected supply system, which is 3-phase 60 cycles, is tapped off to feed 14 sub-stations, distributed along the 440 miles of line at an average distance of 32 miles apart. A typical sub-station will be described farther on.

Power Demand.—The electrified section of the railway is divided into two operating sections, one from Harlowton to Deer Lodge and one from the latter town to Avery. In parenthesis I may mention that prior to electrification there were four operating sections in the same distance, each with its round house and operating staff. I shall refer to this later when speaking of economies. Considering only the eastern section (Harlowton to Deer Lodge), which is 226 miles long, the peak demand is about 20,000 k.w. in summer and the average demand 9,600 k.w., or about 48 per cent. load factor. In winter, both the peak and average demands are somewhat greater. Considering this rocky mountain section only, I gathered the following specific data for the month of August, 1916:—

	K.W. hours.
Goods traffic (127,630,000 ton miles)	3,923,292
Goods traffic helper locos.	562,500
Passenger train traffic	1,290,000
Passenger train lighting	9,000
Miscellaneous power	186,053
Total monthly consumption	5,975,850

The goods traffic is principally through traffic—six to eight trains of a maximum 3,000 tons gross moving daily in each direction. Careful tests have proven that it requires on the Harlowton-Three Forks Division 38·4 k.w. hours at the locomotive per 1,000 ton miles, and east bound the same haul requires 27·5 k.w. hours. The average is thus 32·9 k.w. hours. Correcting this by taking into account the distribution and conversion losses we have 49·2 k.w. hours per 1,000 ton mile. Since Harlowton and Three Forks are approximately the same altitude (4,163 feet and 4,065 feet respectively), it is evident that the greater power taken on the westward haul is due to the long 2 per cent. gradient met with in climbing to the summit of the Rockies, and to the regenerated

power developed by trains descending the same grade eastward. The passenger traffic consists of two through trains daily in each direction, each consisting of eight steel coaches—making per train a trailing load of about 700 tons. Also one light local train each way. These quantities of energy represent the totals of the watt-hour meters on the locomotives (and thus take into account the saving of power effected by regenerative braking), and each has been corrected by dividing by the known average efficiency of the system, which is 67 per cent. This latter figure includes all losses between the feeding points of the Power Company's lines and the locomotive trolley (*i.e.*, line losses, transformer losses, motor generator losses and trolley wire losses).

Power Cost.—The power contract existing between the Railway and the Power Company is based on a sliding scale depending upon load factor, but it will suffice for our purpose to state that during August, 1916, the rate was 5·36 cents (=about 2¾d.) per k.w. hour. The price paid for power on that section for the month was $32,030 (=about £6,600). The average cost of power per 1,000 ton-miles of goods traffic is 20·5 cents (=about 11d.). Substation operation amounts to about three cents per 1,000 ton-miles of goods traffic. (This does not include power losses in the substation, which are included in power cost.) I may here mention that the goods locomotives are designed to haul a train of 2,500 tons (trailing) on all grades up to 1 per cent. at 16 miles per hour. Three thousand tons trains with two locomotives negotiate grades of 2 per cent. at somewhat lower speed. The passenger locomotives are designed to run up to 60 miles per hour on tangent level track, and at about 40 miles per hour on 1 per cent. grade. It was my experience that we ran on 2 per cent. grades at about 20 to 22 miles per hour. One locomotive only is used on each through passenger train.

(To be continued.)

Cape Asbestos.

During 1916 the turnover of the Cape Asbestos Company, Ltd., showed expansion, but the costs of labour, materials and freight increased seriously. After putting £5,000 to reserve and providing for excess profits, 2½ per cent. is to be paid on the ordinary, free of income tax, and an equivalent amount on the preference shares, and £5,748 is to be carried forward.

Eldorado Banket.

At Eldorado Banket, during the quarter ended March 31, there were milled 12,098 tons of a value of 12·3 dwts. The gross yield was 7,156 ozs. The working profit was £15,345. Development footage totalled 393 feet, and there are ore reserves on hand 52,294 tons, value 10·6 dwts.

Lydenburg (Transvaal) Gold.

The ordinary general meeting of the Lydenburg (Transvaal) Gold Exploration Company, Ltd., was held recently at the Cannon Street Hotel, London, E.C. Mr. M. T. Brown presided, and, in moving the adoption of the report, said the net result was a balance of profit of £875. Investments at cost showed an increase of £800, which represented the amount put into Exchequer Bonds. There has been a further depreciation in old investments, but that was unavoidable in present conditions.

Planet-Arcturus.

The report of the Planet-Arcturus Gold Mines, Ltd., for 1916 states that the properties at the end of the year consisted of 599 mining claims, 10 claims having been acquired from the Gold Fields Rhodesian Development Company, free of consideration. The continuance of the war and the restrictions on capital issues have entirely prevented any consideration of finding working capital for the purpose of equipping the company's mines with a suitable reduction plant. The ore reserves on the Slate and Arcturus properties are maintained at 309,145 tons of an average assay value of 12·1 dwts. The tributors of the Planet Mine treated 11,469 tons, which yielded a royalty of £4,028.

Barrett.

The report of the Barrett Gold Mining Company, Ltd., for the year ended February 28 last shows that operations for the period resulted in a loss of £158, increasing the debit balance of the profit and loss account to £12,163. The Rautenbach Mine produced 20,632 tons; Suzerain, 9,901 tons; and Red Ground Deposits, 14,659 tons, a total of 45,192 tons dry weight. The tonnage mined was 399 less than for the previous year. Improved values are being shown in certain fresh sections. The tonnage treated at the reduction works was 45,057; the average value of the ore was 1·91 dwts.; and the extraction equalled 87·22 per cent. of the gold contents. The yield was 3,768 ozs., valued at £15,732, after allowing for realisation charges.

Nigel Output.

The returns from the Nigel mine for the month of July were as follows: Tons milled, 12,600; gold recovered, 4,063 fine ozs.; profit, £3,811.

New Heriot.

The following is the result of the operations of the New Heriot for the month of July: Ore milled, 13,500 tons; gold recovered, 5,239 ozs.; profit, £6,809.

The Sheba.

The following are particulars of output of the Sheba mine for the month of July, 1917:—Tons crushed, 6,596 tons, yielding 1,593 ozs.; working expenses, £7,321; development, £750; estimated loss, £1,739.

City and Suburban.

The following are the details of the company's operations of the City and Suburban for July: Tons milled, 27,000; gold recovered, 10,971 fine ozs.; profit, £14,551.

Caustic Soda Shortage.

As a result of the revised instructions by the Home Government, it is now necessary to obtain a licence for any caustic soda for shipment overseas. In view of fears of a shortage, the Association of Chambers of Commerce of South Africa is inviting the views of Chambers on the following matters: (a) The extent of existing stocks, and the possibility of their exhaustion during the coming dipping season; (b) the advisability or otherwise of the Government taking early steps to preclude any possible shortage.

As a result of the phenomenal rains the Vaal River has been running strong, and the breakwater at Elands Drift, near Klipdam, representing nearly two months' work, and costing £800, collapsed on Monday. The majority of the diggers had time to remove their gear. Some, however, were unfortunate, and lost considerably. The report of heavier rains up the river indicated that the other breakwaters on the river would meet with a similar fate.

THE WEEK IN THE MINING MATERIAL AND ENGINEERING TRADES.

Speculators and Business—The Pooling Scheme Quietly Progressing—The Lost Ship—No Cargo for South Africa—Second-hand Material Increasing.

The inclement weather of last week hampered business very considerably, especially in the deliveries, for although it was not much as compared with the northern winter climate, yet the African natives have trouble in contending against such, to them, strange climatic conditions. However, in reality it did not matter much, as business is slow and uncertain, chiefly because of the pooling scheme. The principal trading at present is with the commercial community and outside districts, also there is considerable business passing between merchant and merchant. In this respect much friction has occurred by the intervention of speculators, who have happened to gain inside knowledge that certain lines would be required, therefore small corners are engineered, much to the chagrin of the buyers when they eventually come into the market. However, that has little concern for the speculator, because when he once gets a real grip, he holds on for all it is worth.

The Pooling of the Mines.

This is progressing gradually, the only check being the immense amount of clerical work. However, the list is getting a big one, as follows:—Angle steel, drill steel, steel shafting, axes, boiler tubes, bolts and nuts, cast steel, condenser tubes, dogspikes, drills, H.S. twist drills, H.S. tool steel, fish plates, fish bolts, hose, hammers, hammer handles, insertion, mild steel bars, crushers, crusher spares, mill spares, mortar boxes, piping, packing, picks and handles, rails, rope, shovels, spanners, wrenches, spring steel, steel plates, steel balls, valves, waste, and wire nails. Naturally this list will be added to week by week. It must be borne in mind that the mines, etc., under the control of the chief buying administration must send their orders for the material and goods named to the chief office, which is the only medium for arranging the supplies to the individual mines from the merchants.

Shipping, both British and American.

The last two British mails brought a very miscellaneous cargo, the bulk being drapery, clothing, and soft goods, none of which require special permits. There was a fair sprinkling of mining material as well as a small quantity of white lead and paints. The miscellaneous cargo comprised much drapery and clothing. Then came smaller consignments of boots, medicines, household chemicals, fancy soaps, and stationery. The conclusion to be drawn is that for mining essentials and machinery it is not the question of shipping so much as obtaining goods and material from the manufacturers. However, private advices state that even in this respect better results may ensue shortly. In shipping circles the idea is practically unanimous that greater restrictions will come about both on the British and American routes for a time, and then fair relief can well be anticipated. In the meantime the neutral shipping is being attracted to the American-British trade route, as they can command very high freights, and it is a comparatively short journey. The loss of the City of Athens near Capetown will not affect Johannesburg merchants, except in the loss of mail letters and the parcels post, as application was made to the agents here and the reply was that the ship had no cargo for South Africa.

Paints, Varnishes, Oils, Colours, etc.

There has been a phenomenal rise in shellac from 2s. 6d. to 4s. 6d. in Johannesburg, being a reflex of the sharp advance in London from 112s. to 246s. per cwt. Linseed oil is still quietly on the up grade as the 5-gall. drums are now quoted from 45s. to 47s. 6d. All putties are sold on a basis of sixpence per lb. Right throughout the paint trade

there is a lot of buying amongst contractors and jobbing men, which is not unduly encouraged by the recognised houses. A weak position is developing in brushware, as the latest advices from London are that, owing to the continued advance in the cost of material and in the increase in wages, the list prices have been advanced quite ten per cent., and further the manufacturers have been compelled to cancel sixteen lines in everyday brushware on account of the shortage of Russian bristles, as well as the great difficulty in obtaining copper ferrules. The position in Johannesburg is that the ordinary paint brush 8/0 is unobtainable. Distemper brushes are 17s. 6d. to 22s. 6d. each; oval varnish, 1s. 6d. to 7s. 6d.; and paperhangers', 7s. 6d. to 9s. 6d. The local brush makers are assisting the position, and improving as much as the raw material will allow.

Second-hand and Other Material.

During the bad weather there was quite a lull in business; this has enabled the yards to increase their stocks, as the high prices for roofing iron and anything like decent woodwork have brought forward much material. Orders for mining material and the smaller machinery have been markedly absent. However, a small mining proposition in Zululand has sent a few orders for material and machinery, as well as equipment, which cannot be obtained at the coast. The Belgian Congo has sent big enquiries to Johannesburg without much business resulting, as dealers and merchants are holding aloof, as they cannot see their way to replenish materials sent outside the Union, through priority certificates. There are some good orders from the railway department for copper tubing and electrical appliances; but in consequence of the scarcity of both new and second-hand, tenders have only been available for a tithe of the orders.

Electrical Goods.

The position is getting more acute in the shortage of incandescent lamps of all kinds, and it was a great disappointment that none came by the last two mail boats. However, cable advices are a little more encouraging, as they indicate that special efforts are being made to forward supplies of the ordinary household lamps during the present month. On these advices, lamps are being sold to arrive, which is a new feature brought about by the war conditions.

Foundries and Engineering Shops.

These are overburdened with work, and unless a job is of a very urgent nature to keep a mine going it may take any time from a fortnight to a month to get work done. What the foundries are suffering from is the dearth of scrap iron, as well as pig iron, therefore it is very good news that the Pretoria Municipality has leased a portion of their town lands to a company for the purpose of producing pig iron, etc. It is understood that other schemes are in hand to exploit our deposits of iron ore from the experimental to the commercial stage. An expert who gained his experience amidst the iron smelting works in the old country, states that if only a decent pig iron can be made here, to those concerned it would be a better proposition than a gold mine.

Revised Price List.

Iron, imported, round and square, ¼in., ⅜in., ½in., 60s. average; ⅝in. to 2in., 37s. 6d.; local, ⅜in. up, 25s. 6d.; ditto, square, ½in. up to 1in., 30s. to 45s.; 1¼in. to 2½in., 25s. to 30s.; 2¾in. to 5in., 25s.; angles, ½in. 42s. 6d., ⅝in. 37s. 6d.; ¾in. up 23s. 6d. to 32s. 6d.; angles very dear, averaging 50s. to 55s.; local 30s. to 35s., Hats, local, 25s. 6d., mild steel bar, 5½d. per lb.; drill, 1s. per lb.; steel plates, 60s. to 67s. 6d.; some sizes unobtainable; hexagon and cuphead bolts, ¼ inch diameter, 1s. 9d. per lb.; 5/16 in. diameter, 1s. 6d. lb.; ⅜in. dia. up to 3in. long, 1s. lb.; ⅝in. dia., 11d; 3¼in. and up long, 11d. lb.; ¾in. dia. up to 2½in. long, 62s. 6d. 100lb.; ½in. dia. and 2¾in. up long, 60s., 100lb.; ⅝in. dia. up to 2¼in. long, 55s. 100 lbs. ⅝in. dia. 2¾in. and up long 52s. 6d. 100 lbs.; ¾in. dia. 2¾in. and up long, 50s. 100 lbs.; ⅞in. and 1in. dia., same price as ¾in. diameter; nuts, ⅜in., 1s. 3d. lb.; ½in., 65s.; ⅝in to 1¼in., 62s. 6d.; 1⅜in and 1½in., 70s.; 1⅝in. to 1¾in., 75s.; 2in. up, 85s.; washers, all sizes, 15s.; rivets, 3-16in., 1s. 6d. lb.; ¼in., 5-16in., 1s. 3d. lb.; 7-16in., ⅜in., 9½d. lb.; ½in., 52s. 6d.; ⅝in. 55s.; ¾in. up, 49s. 100 lbs.; shoes and dies, 32s. 6d. to 35s. per 100 lbs.; rails, £25 per ton; picks, 4lb., 40s. per dozen; shovels, 32s. 6d. to 55s. per dozen; drill hammers, 5½d. to 6d. per lb.; hammer handles (best American), 14in., 3s. 6d., 24in., 7s., 30in. 9s 6d., 36in., 13s. per doz; metal, anti friction, 1s. per lb.; galvanised iron, 24 gauge, 6 ft. to 10 ft., 2s.; 11ft., 2s. 1d., 12ft., 2s. 2d.; 26 gauge, 6ft. to 8ft., 1s. 9d., 9ft. and 10ft., 1s. 9d.; flat galvanised, 18 to 24 gauge, 115s.; 26 gauge, 110s. 100 lb.; floor brads, 40s.; ceiling, 42s. 6d.; wire nails, 45s. to 55s. per 100 lb.; solder, 50 per cent., 1s. per lb.; locks, rim, 66s.; mortice, 70s. per dozen; barbed wire, 45s. per 100lb. coil..

Timber: Deals, Baltic, 9 x 3, 1s. 3d. to 1s. 4d.; flooring, 4½ x ⅞ and 6 x ⅞, 7¾d. to 8d. per sq. ft.; do., 4½ x 1½, 9½d.; and 6 x 1¼, 9½d.; ceilings, 6 x ½, 4½d. to 4½d. per square foot; pitch pine, 8s. to 8s. 6d. per cubic foot; Oregon, 6s. 3d. to 6s. 6d. per cub. ft.; clear pine, ½ in. x 12 in., 10½d. per ft.; 1in. x 12in., 1s.; teak, 15s. per cubic foot; jarrah, 9s. 6d. per cubic foot; poplar, 1in. x 12in., 1s.; scantling, 1s. 3d. to 1s. 3½d. per foot., 3 x 9.

Bricks, cement, lime, etc.: Pretoria Portland Cement, 9s. 3d. per bag; 8s. 3d. truck loads; lime, white, unslaked, 7s.; truck loads, 6s.; slaked, do., 5s.; blue, 3s.; plaster lime, 4s.; bricks, stock delivered, 37s. 6d. to 45s.; wire cuts, 50s. to 70s.; pressed, 70s. to 80s. per 1,000, road transport difficult to obtain; salt and white glazed bricks, £27 10s. per 1,000; roofing tiles, £25 per 1,000; Roman do., £12½; glazed tiles, 10s. 6d. to 17s. 6d. per yard; paving cement tiles, 8s. 6d. per yard laid; reinforced concrete columns, 6 ft. plain, 22s. 6d.; fluted, 21s.; fireclay bricks, £7½ to £9½, at kiln, per 1,000; clay chimney pots, 36s. to 70s., according to height, 12 in. to 18 in., per doz.; fire clay, 37s. 6d. per ton on rail.

Oils, paints, lead, oxide, glass: Linseed, raw and boiled, 45s. to 47s. 6d. per five gallons; white lead, 1s. per lb. (big lots not quoted); turpentine, 57s. 6d. 2/4 gallons; 10/1, 62s. 6d.; oxide in oil, 36s. per 100lb.; dry oxide, 22s. 6d. to 27s. 6d.; linseed oil putty, all at 6d. lb.; grease, A.F. axle, 26s. 6d. to 28s. 6d. per 100lb.; tallow, 1s. per lb.; White Rose paraffin, 18s. 9d. 2/5; Laurel paraffin, 18s. 6d.; petrol, 30s. 6d. to 32s. 6d. 2/4; motor oil, 7s. to 7s. 9d. per gallon; engine lubricating oils, 27s. to 40s. per case; cylinder, 26s. 6d. to 42s. 6d.; paints in tins, 1s. to 1s. 3d. per lb.; British plate glass, ¼in., 3s. 9d. to 4s.; do., mirror, 5s.; window, 16oz., 1s. to 1s. 3d. per foot.

Chemicals: Mercury, £55 to £60 per 75lb. bottle last sale, but now no definite price; bichmôrate potash, 5s. 6d. lb.; chlorate, 4s. 6d. per lb.; permanganate, 14s. lb.; alum, 6d. lb.; carbolic acid, 7s. 6d. lb.; borax, 92s. 6d. 100 lbs., cyanide soda, 1s. 5d. lb.; hypo, 9d. lb.; acetate lead, 77s. 6d. 100 lbs.; litharge (assay), 72s. 6d., (commercial) 58s. 6d. 100 lb.; zinc sheets and blocks, 1s. 9d. lb.; plumbago crucibles, 5d. per number.

Electrical goods: Lamps, high volts, British, Holland, and American, 36s. wholesale, and 54s. dozen retail; carbon lamps, 10s. 6d dozen; pure rubber flex, 6d. to 8d. per yard; 3/20 coils of wire, 30s to 33s.; do., 3/22, 23s. 6d.; tubing, 18s. to 20s. 100 ft.; keyholders, 6s. to 7s. 6d. each, round blocks, 3½ in., 3s. 6d. doz.; lamp holder cord grips, 13s. 6d. to 15s. per dozen; switches, 5 amp., 24s. to 30s. doz.; British glass shades, 30s. to 40s. dozen, porcelain shackles, 15s. to 18s. dozen; do., bobbins, 12s. 6d. to 14s per 100; cleats, 20s. per 100; P.O. insulators, 18s.; motor, 3 h.p., about £35 to £37, new.

In consequence of the daily, and even hourly, variation in prices, the Editor will answer reply-paid telegrams to verify any quotation in our list.

Company Meetings.

VILLAGE MAIN REEF.

The 25th ordinary general meeting of the shareholders of the Village Main Reef G.M. Company, Ltd., was held on June 29, at Salisbury House, London Wall, E.C., Mr. M. A. Bramston (the chairman and managing director) presiding.

The acting secretary (Mr. F. de M. Cunynghame) read the notice convening the meeting and the report of the auditors.

The Chairman said: Gentlemen,—I presume it is your wish to take the reports for the year of the directors, consulting engineer and manager as read. The balance-sheet does not show much variation from last year. On the assets side the amount against machinery, etc., is reduced to £79,428, due to sales. Cash at the end of 1916, less the dividend since paid, figures at £36,291, against £10,375 on 31st December, 1915. Our investments, which are estimated at cost price or under, stand at £219,193 18s. 3d. Last year they stood at £192,868 3s. 9d. You will note that this year £65,000 Four-and-a-Half per Cent. of War Loan is included in our investments. This Four-and-a-Half per Cent. War Loan has been converted into the new Five per Cent. War Loan, and we have during the current year increased our holding, which now amounts to £98,150. We feel assured that our shareholders will approve of our having invested the company's money in the National Loan. (Hear, hear.) You will note, if you turn to the appropriation account that £36,253 2s. 6d. has been written off investments. This item is mainly accounted for by the depreciation of the Village Deep shares. The amount appears to be a somewhat large one; but, as I said last year, we are not the only company which has found it prudent under present conditions to write down investments. Turning to the profit and loss account, the balance carried to appropriation account is £106,508, being only slightly less than the figure for 1915, which I think must be regarded as quite satisfactory, considering the difficulties of mining at this late stage of the mine's life. Although the tonnage milled exceeded by 32,000 tons the total for 1915, and working costs were reduced by 2s. 7d. per ton, the yield, as was expected, decreased by 4s. per ton. The balance on appropriation account brought forward to the current year is £197,865.

The ore reserves at 31st December last were estimated at 750,000 tons of a value of 6.6 dwts., or 27.7s. per ton, an increase of 115,000 tons as compared with 1915. It is very satisfactory to note that although a large amount of ore was extracted from the mine during the year the reserves are now considerably more than they were at the commencement of the year. In commenting in 1913 on the position of the ore reserves as at the end of 1912, I informed you that we expected to get some 600,000 tons of ore out of the mine over and above the blocked out ore reserves as declared in the manager's annual report. The total quantity of ore thus left to be worked was 2,283,000 tons, and I find that since that date we have taken out 1,728,000 tons, to which must be added the 750,000 tons in sight as at the end of last year, or 2,478,000 tons in all. It is probable that as reclamation work proceeds further additions will be made. All the earlier estimates of life of the mine brought our activities to an end with 1916, but as you now see from the reports, we have yet two to three years before us on a reduced scale of operations. The movements of strata, more fully referred to in my last address, continue to occupy a certain amount of attention, but the energetic measures taken to relieve the main shaft of the strain put upon it by the dislocation of the ground appear to have been effective, and the year has been free from serious trouble.

I am pleased to be able to state that a Bill has quite recently been passed in the House of Assembly whereby the long outstanding Bewaarplaatsen question has been settled. It is provided that within six months of the Act coming into force 19-40ths of the sums received by the Government prior thereto shall be paid to the freehold owners in the shape of Union Five per Cent. Local Stock and 18-40ths of the moneys received thereafter by the Government shall be paid to the freeholders within three months of such receipt, the Government having the right to liquidate the latter liability also in Union Five per Cent. stock during the continuance of the present war and for 12 months thereafter. It will be observed that the freeholders' proportions represent 50 per cent. of the net proceeds derived from the mining rights, less 2½ per cent. and 5 per cent. respectively. Your company, by virtue of its 18.4 per cent. interest in the Central Rand Freehold Proprietary Syndicate, is entitled under the provisions of the Act to approximately £46,500, of which amount £20,000 will be payable within, say, six months' time and the balance later in instalments spread over the following 14 years. This period far exceeds the remaining life of our property, but there should be no difficulty in discounting the remaining instalments. The conversion of the Five per Cent. stock into cash should be possible at any time. Of our employees in South Africa, 54 at present are on active service, and this company is making fair allowances to their dependents. I regret, however, to say that since the commencement of the war four of our employees have lost their lives in the service of their country. I now beg leave to move: "That the report of the directors and the audited statement of accounts to December, 1916, be received and adopted, and that dividend No. 32 of 2s. per share, free of income-tax, be declared payable to all shareholders registered on 30th June, 1917, and to the holders of coupon No. 31 attached to share warrants to bearer."

Mr. T. J. Milner seconded the resolution.

The Chairman: I shall be pleased now to hear any observations on the part of the shareholders.

Mr. Pritchard: I shall be glad if the chairman will give the meeting an account of how the investments stand with regard to the full capital of the company. I shall also be obliged if he will give us some idea of the life of the mine.

The Chairman: I gather that the shareholder requests me to give him the details of the investments at cost or under amounting to £219,193. This is made up of 118,000 Village Deep shares, amounting to £157,825, War Loan £62,400, and the balance is accounted for by our holding in the Co-operative Exchange Yard and other associations to which we belong and which provide for certain requirements of the mine. I think you also asked a question as to the life of the mine. The consulting engineer, in his report, states: "It is probable, from present indications, that on a slowly decreasing tonnage output the mine will continue to earn profits for about three years." I am afraid I was a litle more conservative. I said from two to three years; but I hope the consulting engineer is right, and probably he is.

Mr. C. Purkiss: Might I ask whether in the event of the mine or the company being wound up, those shares in the Labour Associations will be worth anything to us?

The Chairman: The answer to that question is that you can practically count upon this amount, because there are many mines on the Rand which form part of these associations, and when one mine ceases to exist the other mines absorb the shares.

Mr. Pritchard: What I really want to know, if you can tell us, is how the assets, not including the money in hand, compare with the total capital of the company.

Mr. T. J. Milner: You can only calculate it on the basis of your investments, the value of the ore still remaining in the mine, and also the value of the plant and machinery at the end of the life of the mine.

Mr. Pritchard: What I thought was that the assets were sufficient to meet the capital of the company, so that you could distribute 20s. per share, quite irrespective of what is in the mine.

The Chairman: Our accountant has made a rough calculation, the responsibility for which the Board cannot take, but we give it to you on those conditions. Our accountant believes that at the end of the mine there will be 13s. in the £ derived from investments, and in addition to that there will be the value of the freehold and also the break up value of the plant and machinery or whatever is left.

A Shareholder: I should like to ask if there is any probability of the shares in the Village Deep being distributed to the shareholders.

Mr. T. J. Milner: I think the same question was raised at the last annual meeting, and I then stated that the directors would take the matter of distributing the Village Deep shares into their consideration. We did so, and we found that something like 50 per cent. of the shares of your company is represented in the form of bearer shares, and that these are held principally abroad. Therefore, you will see that under existing conditions it is quite impracticable to consider the question of distributing those shares to-day.

The resolution was then put and carried unanimously.

The Chairman proposed the re-election of the retiring directors, Messrs. C. S C. Watkins and F. J. Dormer.

Mr. H. F. Marriott seconded the resolution, which was unanimously agreed to.

On the motion of Mr. C. Howard, seconded by Mr. Vere Herbert Smith, the auditors (Messrs. Fuller Wise Kirby and Fisher) were re-elected, and the proceedings terminated.

DAGGAFONTEIN G.M. CO.

The 15th ordinary general meeting of the Daggafontein G.M. Co., Ltd., was held recently at Egypt House, 36 New Broad Street, London, E.C., Mr. H. G. Latilla (chairman of the company) presiding.

The notice convening the meeting and the auditors' report having been read.

The Chairman said: Gentlemen, we did not know that this was going to be a Bank holiday, or we should not have convened the meeting for to-day. There is very little for me to say. I think the accounts require no explanation at all. You are all aware that the expenses are being paid by Henderson's Transvaal Estates, Ltd., under the arrangement we made with them when we entered into the contract for the sale of the property to the Daggafontein Mines, Ltd The one

matter which remains for us to do is to distribute the shares and options in the new company. We are quite ready to do this, but we are awaiting the decision of the Stock Exchange committee as to whether they will grant a settlement which has been applied for in the new shares and options. If, as we hope, they do so grant that settlement we shall at once convene a meeting of shareholders to go into liquidation, when we can distribute both the shares and the options. It was my intention to read the report of the proceedings at the general meeting of the new company in Johannesburg; but as a copy will be sent to every shareholder I do not think I need trouble to do so. If there are any questions I shall be pleased to answer them. I will now move: "That the report and balance sheet, as presented, be, and they are hereby received and adopted."

Mr. W. L. Castleden seconded the resolution.

In reply to Mr. E. A. Wood, the Chairman stated that this company was merely a holding company. The whole of the property had been sold to the Daggafontein Mines, Ltd., and the Daggafontein Gold Mining Co., Ltd., now held 268,253 fully-paid shares and option certificates for 134,126 shares in the Daggafontein Mines, Ltd. In other words, two shares in this company were represented by one share and half an option in the new company. There was no market in London for the new shares, but there was one in Johannesburg, where the company was registered.

The resolution was carried unanimously.

Mr. Castleden proposed the re-election of Mr. H. G. Latilla, the retiring director.

Mr. W. E. Lawson Johnston seconded the motion, which was unanimously agreed to.

The auditor (Mr. J. H. Stephens) was then reappointed, and the proceedings terminated.

HENDERSON'S TRANSVAAL ESTATES.

The fifth ordinary general meeting of Henderson's Transvaal Estates, Ltd., was held on July 20 at River Plate House, Finsbury Circus, E.C., the Right Hon. the Lord Cranmore and Browne, chairman of the company, presiding.

The Chairman, in the course of moving the adoption of the report and accounts, went through the various items, and said the result of the year's working was a profit of £31,902, as against £33,363 in the previous year, but it must be borne in mind that dividends and interest, which was the largest item of profit was subject to a much higher rate of income tax than was formerly the case. While the profit was not quite sufficient to cover the dividend, they would carry forward nearly £50,000, and there was every reason for satisfaction at the result of the year's operations. Proceeding to deal with the interests held by the company, the chairman said the Tweefontein Colliery Co. had again distributed dividends of 25 per cent. on the Ordinary shares and 10 per cent. on the Preference shares, and they anticipated continued and increasing prosperity in the coal trade of the Transvaal provided an adequate supply of railway rolling stock was available to meet the increased trade. As they informed the shareholders in the report, the development of the Tweefontein No. 236, No. 1 area, had been proceeded with, and as they mentioned in the report, they hoped to be in a position to supply coal under the contract with the South African Railways within the next two months. They were doubtless aware that the bulk of the coal trade of the Transvaal was controlled by the Transvaal Coal Owners' Association, which was a combination of the principal collieries. The combine at present in existence expired on June 30, 1918, and the new combination would be for a period of five years. He was not certain whether all the terms of the new agreement for the period commencing July 1, 1918, had been settled, but he knew that the clause determining the outputs to be allocated to each company comprising the association had been arranged. Under the agreement the Henderson Consolidated Corporation, which was the owner of Tweefontein No. 236, had been admitted to membership, and was assured of a satisfactory monthly output from July 1, 1918. The payment of a first dividend of 12½ per cent. by the Cement Co. had fully justified the high opinion they formed as to prospects of the enterprise. They were informed that the success of the company was assured, and were confident that with the return of normal times in South Africa the undertaking would participate in the general prosperity which might be anticipated. Those interested with them in this business were the leaders in the cement industry in the Empire, and they, therefore, benefited from the expert knowledge which they had acquired from years of investigation and practical experience. While the opening up of the Daggafontein property had been very fully dealt with in the report, he would draw attention to the fact that the most encouraging development had been in the West Haulage. That part of the mine lay in the direction of the Springs Mines, which, as they doubtless remembered, had now reached the producing stage. The profits of the Delagoa Bay Development Corporation, Ltd., which came into the year under review, while showing some improvement as compared with the previous year, did not justify a distribution to its shareholders. The corporation had suffered through the war more than any other with which their company was associated, the principal reasons being the low rate of Portuguese exchange, and while, as shareholders, they regretted that the corporation was not in a position to resume the payment of dividends, they had every reason to believe that it would eventually justify the confidence which they felt in its ultimate future. With regard to agriculture and land settlement, their general manager advised them that the four years drought had been to some extent relieved by good, though late, rains for the 1917 crops, and in the absence of late frosts there should be a very large crop of maize this year. Should this prove to be the case they hoped the demand for land would improve, and that they would be able to dispose of more of the surface rights of their properties than had been the case during recent years. The 1917 Budget for the Union of South Africa made no reference to a land tax, but in spite of that he had not altered the opinion he held as to the imposition of taxation of this character, if not in the immediate future, at some not far distant date. It had been reported that the Minister of Lands in the South African Parliament stated that the Land Owners' Association, of which they were a member, refused to offer land for returned soldiers, except at exorbitant prices. He was not, of course, in a position to know what other members of the association were asking for their land, but as chairman of the Henderson Consolidated Corporation (through which company they held their principal land interests), he did know that the prices at which they sold, and were prepared to sell, their surface rights, while naturally governed by the value at which they stood in their books were moderate in the extreme. He moved the resolution.

Mr. W. L. Castleden, managing director, in seconding the resolution, said the company was now well on the way to success. By this he did not mean dividends at a very high rate in the immediate future, but steady progress in the development of the valuable interests which the company undoubtedly held, so that eventually the company would receive from its varied assets an annual revenue which would enable it to maintain its present strong financial position, and at the same time distribute an increasing dividend to its shareholders. The asset which promised the quickest return was coal, and from this source alone they would get a large annual income.

The report was unanimously adopted.

BRITISH SOUTH AFRICA CO.

The annual ordinary general meeting of the British South Africa Company was held on Thursday, July 5, 1917, at the Cannon Street Hotel, London, E.C. The Right Hon. Sir Starr Jameson, Bart., C.B., presided. The President first referred to finance. The cash and liquid securities figured at the end of 1916 at £1,265,000. This year the Chief Accountant wrote: "The accounts for the year just ended are not yet completed, so that I am unable to give you figures showing how the increase in our liquid resources has been caused. On the other hand, in order to continue our developments it has been necessary to incur certain capital outlay. The interesting point is that we have not only spent some £200,000 on necessary capital requirements, but have increased our liquid resources at the same time." He goes on to say: "While on the subject of liquid resources, I wish to make it quite clear to you that we include in this category only first-class bonds and debentures, and not shares, although many of the latter, especially those in prosperous undertakings, are exceedingly liquid, even in present market conditions. I estimate that the market value of our saleable and quoted shares stands at £2,000,000; that is to say, we have in our portfolio £2,000,000 worth of saleable shares in excess of liquid resources of £1,450,000." We have at the present time £3,450,000, and outside that we have a fairly well-filled portfolio of shares which in time will be valuable and will be saleable. Speaking of the mineral output, the chairman said: Our mineral output has been a record; it has been a record ever since it began, and even in war time it is a record again, showing an increase of £430,630 on the previous year. It is true that there are no new large mines opened up. As a business community you will understand that in these times there is not much capital going out to open up large gold mines. With regard to railways, last year Sir Henry Birchenough told you that they had had a set-back, but they were perfectly sure that there would be no call from the railways to the Chartered Company for help in their financial transactions. That is more than justified, because if you look at the report you will find that though in 1915 there was a big drop from £862,000 of net receipts to £639,000, in 1916 we practically made up that difference, going up again to £861,000, so that really the railways are more than paying their way. In fact they are accumulating a certain amount of profit. The Chairman, having referred to the suggested amalgamation and the ranches, dealt with the future of Rhodesia. I think Rhodesia is well advised to stand by what they gave an overwhelming vote for at the last election, and that was that they should continue the Charter until they can get responsible government, and then to decide their future as to whether they should come into the Union or not.

Mr. P. Lyttelton Gell seconded the adoption of the report, and it was carried unanimously.

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